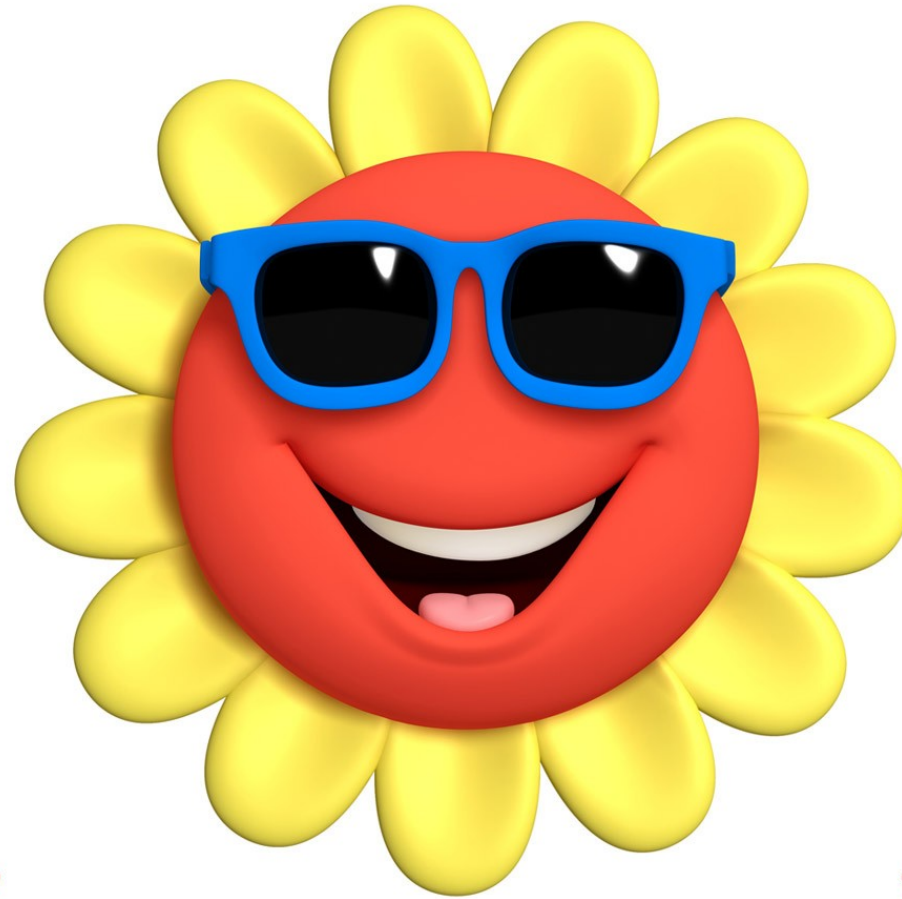




Armed Forces College Of medicine AFCM



‘Today is a new day to renew our mind this morning.
HAVE A GREAT MORNING’



Pathology of hype:

Prof. Eman Abdelbary



Intended Learning Objectives (ILOs)



By the end of this lecture the student will be able to:

1. Summarize the etiology, pathogenesis, pathological features and complications of hypertension
2. Compare between aetiology, pathological features and effects of benign and malignant hypertension
3. Summarize causes, types and complications of vasculitis
4. Correlate between pathological features, laboratory findings and clinical picture of Vasculitis.

Lecture Plan



1. Part 1 (10 min): Definition and types of hypertension
2. Part 2 (20 min): Aetiology & pathological features of essential hypertension
3. Part 3 (10 min): Types of vasculitis
4. Lecture Quiz (5 min)

Hypertension



Definitions:

Benign hypertension: Gradual moderate rise of blood pressure \geq 140/90 mmHg

Malignant /accelerated hypertension: Rapid rise of blood pressure \geq 180/120 mmHg + papilledema and retinal Hge & exudate
Accelerated hypertension: is malignant hypertension

developing on top of benign hypertension

Hypertension



Classification:

😊 ***Etiological classification:***

**Primary
(95%)**

Without obvious cause

**Secondary
(5%)**

😊 ***Clinico-pathological classification:***

**Benig
n**

**Maligna
nt**



Etiology of hypertension



Primary (essential)

1- Genetic factor:

- gene defects in enzymes involved in aldosterone metabolism e.g aldosterone synthase
- Mutations in protein affecting sodium

2- Neurogenic factors:

High sympathetic tone + Chronic stress
↓
Peripheral VC
↓
↑ peripheral resistance

3- Humoral factors:

Renal artery VC
↓
Renal ischemia
↓
Renin secretion
↓
↑ angiotensin
↓
peripheral

4-

Environmental factors:

- ↑ salt intake
- Obesity

Etiology of hypertension



.1 Renal

- Renal artery stenosis
-
- Glomerulonephritis,
- Pyelonephritis,
- Polycystic kidney

Pathological features of
hypertension

Secondary hypertension:

.2 Endocrin

- Pheochromocytoma,
- Primary hyperaldosteronism,
- Cushing syndrome.
- Hyper-estrogenism
- Hyper and Hypo-

.4 Blood

Polycythemia vera

.3 Vascular

- Coarctation of the aorta
- Polyarteritis nodosa

benign & malignant

Pathological features of hypertension



Malignant hypertension Benign hypertension

Rapid progressive rise of BP \geq 180/120 mmHg + papilledema

Rare (medical emergency)

Usually younger age (25-35Y)

Short fatal course

Slow progressive rise of BP \geq 140/ 90 mmHg

Commonest

Usually above 40Y

Long course

Def

Incidence

Age

Course

Pathological features of hypertension



Malignant (hyperplastic) arteriolosclerosis

Benign (hyaline) arteriolosclerosis

Affects small arteries & arterioles

1- Vascular lesions:

- **Fibroid necrosis** (collagen fragmentation + inflammation ± thrombosis)

- **Concentric hyperplasia** of CT & smooth muscle cells
wall thickening & lumen

- **Hyalinosis** of the intima & media with thickening of the vessel wall.

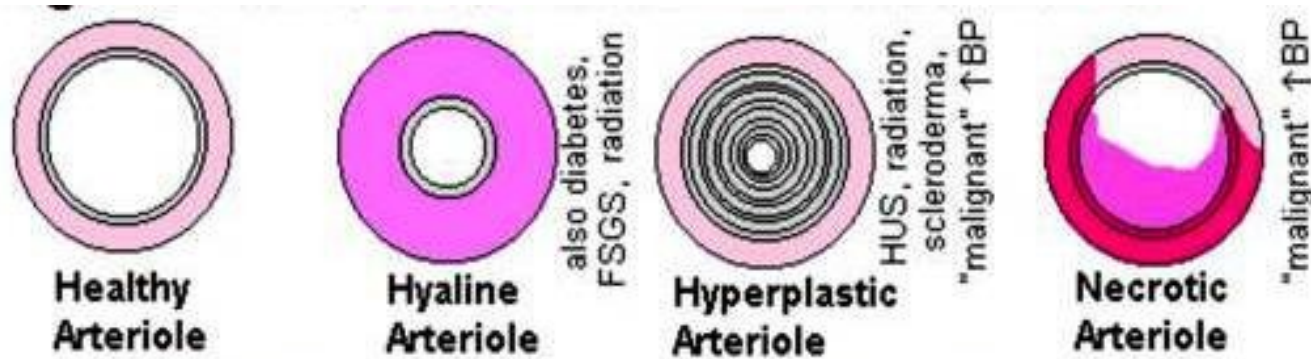
- **Elastosis** (splitting of internal elastic lamina)

- **Atherosclerosis** is

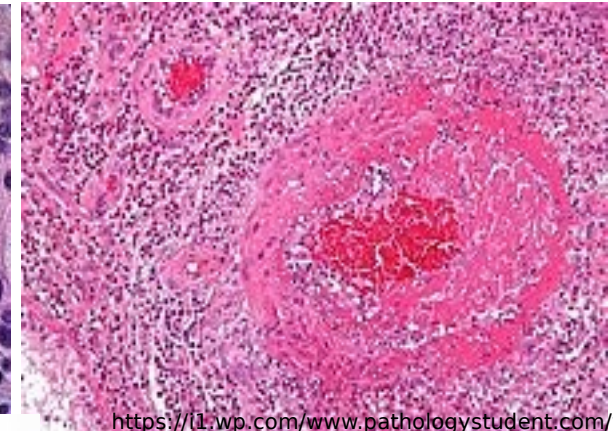
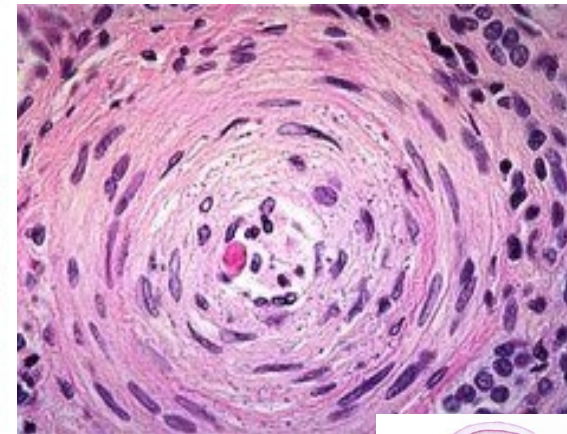
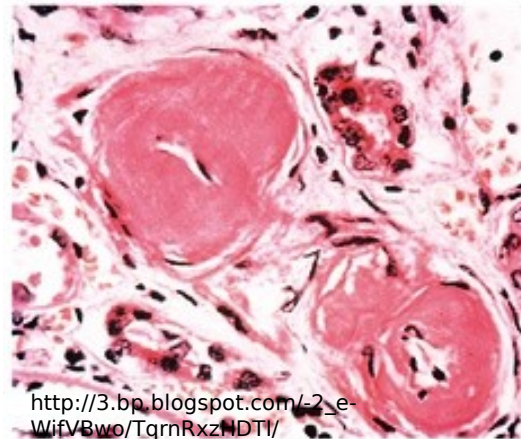
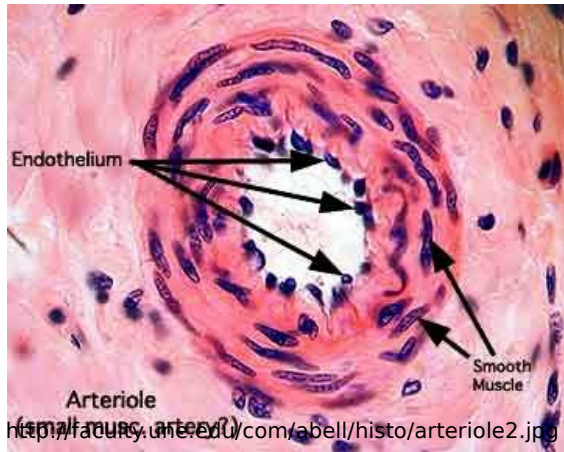
Pathological features of hypertension



1- Vascular lesions:



<https://i.pinimg.com/236x/73/24/c0/7324c08997259f8e0387494c0f320419--anatomy.jpg>



Pathological features of hypertension



Malignant nephrosclerosis

Normal
Smooth
Strips easily

Well demarcated +
hemorrhagic foci
Thick prominent
Normal

Benign nephrosclerosis

Small
Finely granular
Adherent

Fibrotic, atrophic, not
demarcated
Thick prominent
Increased

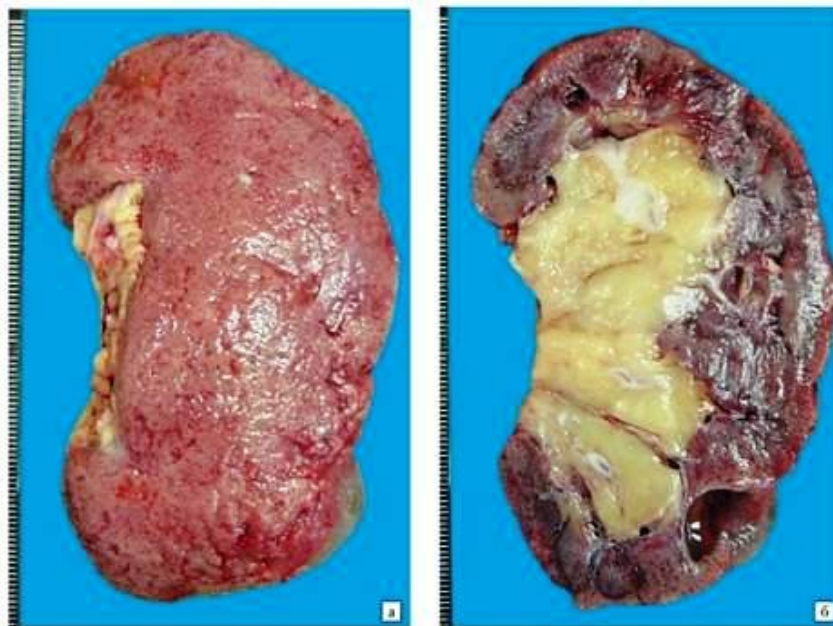
-2
Nephrosclerosis
Size
Surface
Capsule
Cut section:
-cortex &
medulla

- Arterioles
- Peripelvic

Pathological features of hypertension



Malignant nephrosclerosis



http://intranet.tdmu.edu.ua/data/kafedra/internal/patologanatom/classes_stud/en/med/lik/ptn/pathomorphology/3/08_Atherosclerosis.files/image012.jpg

Benign



<https://o.quizlet.com/s-NbLNif7qjFlmLvN8VwAA.jpg>

Pathological features of hypertension



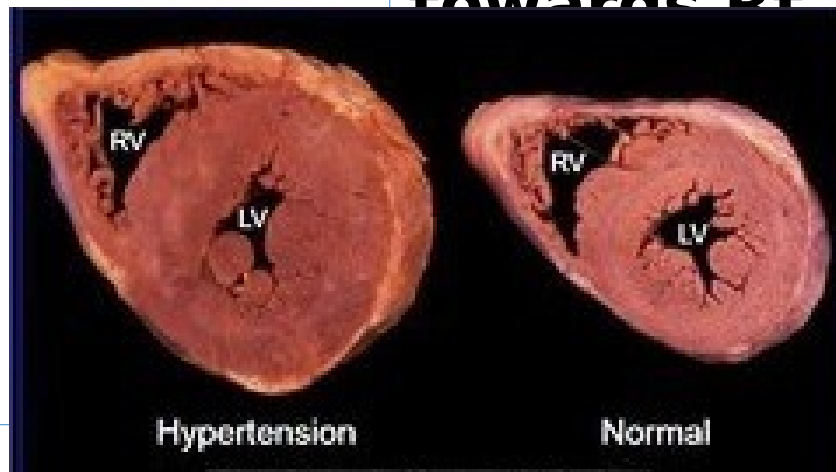
Malignant hypertension

- **Mild** Lt. V. hypertrophy

Benign hypertension

- **Marked** concentric hypertrophy of Lt. V.
- **Bulge** of interventricular septum towards Rt. V.

Heart -3 lesions

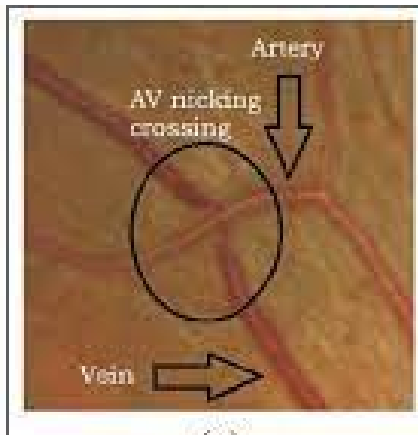


Pathological features of hypertension



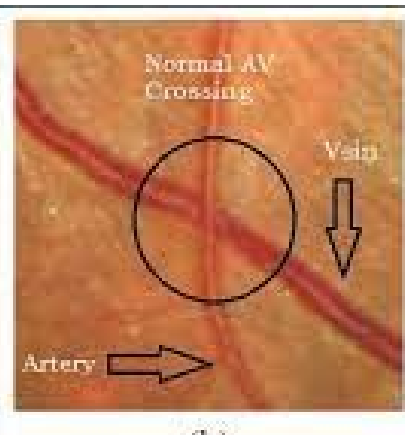
Malignant hypertension

Sever retinal **vascular VC** leads to Papilledema + retinal Hge & exudate (cotton wool white spots)



Benign hypertension

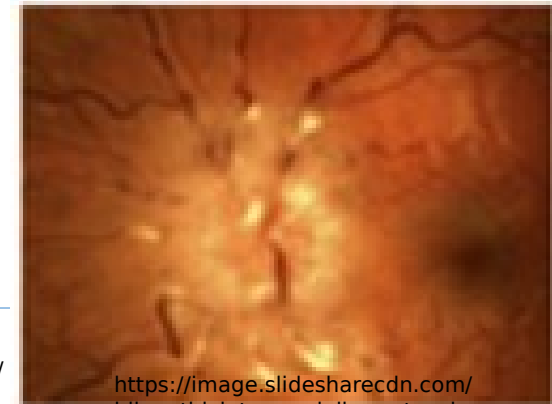
Arterial **thickening & narrowing** leading to compression of retinal vein → vein narrowing retinal exudate



4- Retinal lesions: Hypertensive retinopathy



Retinography.jpg



<https://image.slidesharecdn.com/idiopathicintracranialhypertension-141128091115-conversion-gate02/95/idiopathic-intracranial-hypertension-24-638.jpg?cb=1417165980>

Pathological features of hypertension



Malignant hypertension		Benign essential hypertension
Microaneurysms of cerebral arteries Thrombosis & hemorrhage (stroke)		Pathology: 5- Brain lesions:
Acute renal failure (95%) Cerebral hemorrhage Heart failure	Heart failure (60%) Cerebral hemorrhage (30%) Renal failure (10%)	Cause of death:

Aetiology & pathological features of essential hypertension (Quiz)



What is the most common cause of death in malignant hypertension?

- A. Renal failure.
- B. Congestive heart failure.
- C. Cerebral haemorrhage.
- D. Respiratory failure.
- E. Coronary insufficiency.

Aetiology & pathological features of essential hypertension (Quiz)



What is the most common cause of death in malignant hypertension?

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- D. Respiratory failure.
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Vasculitis



Definition: Inflammation of the vessel wall (Arteritis, phlebitis,

Types: capillaritis)

1) Infectious: Bacterial or fungal infection

2) Non infectious:

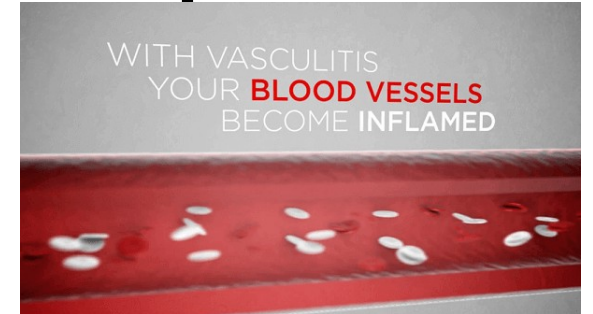
➤ **Hypersensitivity vasculitis: immune mediated diseases with immune complex deposition in vessel wall:**

e.g. - **Polyarteritis nodosa.**

- **Systemic lupus erythematosus.**

- **Wegener's granulomatosis.**

➤ **Buerger's disease.**



Polyarteritis nodosa

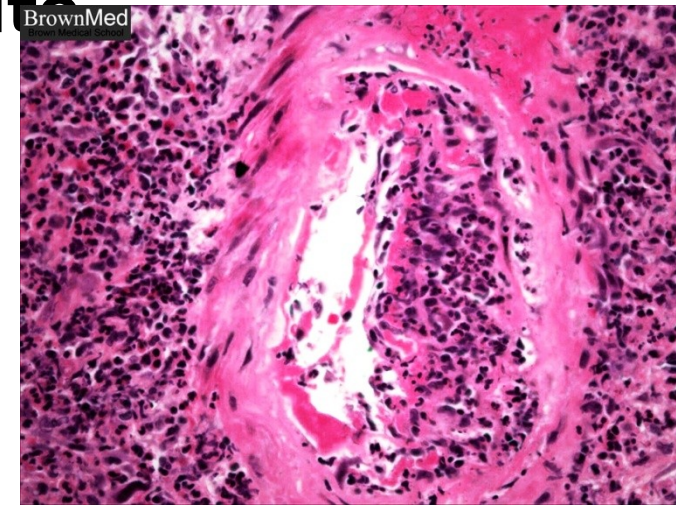


Definition: Autoimmune collagen disease affecting **small & medium sized arteries** of any organ **EXCEPT the lung** (e.g. heart, brain, kidney...etc).

Morphology: Segmental fibrinoid necrosis + acute inflammation of arterial wall

Complications:

- 1. Thrombosis**
- 2. Embolism & organ infarction.**
- 3. Mycotic aneurysms (due to dilatation of fibrotic parts).**
- 4. Hemorrhage (due to aneurysm rupture).**



n+of+this+artery.jpg

Buerger's disease



Synonym: Thromboangitis obliterans

Definition: A segmental inflammation of medium & small arteries that spreads to adjacent veins & nerves (i.e.

➤ **involves artery + vein + nerve)** Affects heavy smoking, middle aged males

Complications: ~~limbs~~ **extremities.**

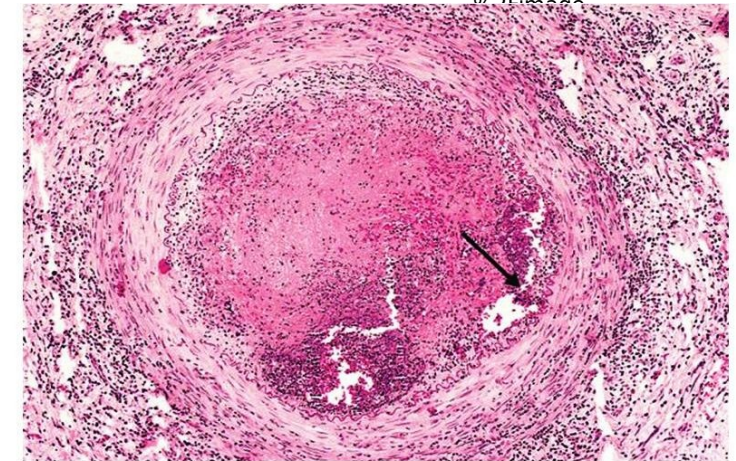
1. Ischemic changes and ulceration
2. Intermittent claudications (sever pain in the limbs)



<https://cdn.savoir.fr/wp-content/uploads/sites/8/2012/01/Maladie-de-buerger.jpg>



http://res.heraldm.com/phpwas/restmb_idxmake.php?idx=68&simg=%2Fcontent/25img22



Thromboangiitis obliterans (Buerger disease). The lumen is occluded by a thrombus containing abscesses (arrow), and the vessel wall is infiltrated with leukocytes.
https://images.slideplayer.com/30/9519996/slides/slide_29.jpg

Types of vasculitis (Quiz)



Which of the following is a risk factor of Buerger's disease?

- A. Female gender.
- B. Old age.
- C. Smoking.
- D. Obesity.
- E. Sedentary life style.

Types of vasculitis (Quiz)



Which of the following is a risk factor of Buerger's disease?

- A. Female gender.
- B. Old age.
- C. Smoking.**
- D. Obesity.
- E. Sedentary life style.

Key points:



- **Hypertension is persistent elevation of blood pressure $\geq 140/90$.**
- **It is classified into primary & secondary, or benign & malignant**
- **Benign arteriolosclerosis is characterized by hyalinosis, elastosis and atherosclerosis**
- **Malignant arteriolosclerosis is characterized by fibrinoid necrosis and concentric hyperplasia of CT and smooth muscles**
- **The most common cause of death in benign hypertension is**

Suggested Textbooks



1. Mitchell R. Blood vessels. In Robbins and Cotran pathologic basis of disease, 9th edition. Kumar, Abbas & Aster (eds). Elsevier Saunders. Pages 487 to 491.
2. USMLE step 1 lecture notes, 2017. Kaplan INC, New York. Pages 103

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